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ABSTRACT

Using a three-part definition of Competency Based Education (competency identification, criteria level, and assessment), five steps for a competency based program development model are proposed and discussed. The steps are: (1) assess the need for such a program, specify the role or performance to which it will be directed and probable characteristics of the program; (2) determine the competencies necessary for competent performance; (3) perpare assessment procedures for the competencies; (4) develop instruction and instructional assessment intended to teach the competencies and measure performance of instruction; and (5) maintain the program through reassessment of competencies, criteria level, instruction, assessment procedures, and need for its existence. (Author/KE)

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EXPERIENCES WITH, AND ASSESSMENT OF, COMPETENCY-BASED CURRICULUM IN DISCIPLINES OUTSIDE OF PHARMACY

by

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EXPERIENCES WITH, AND ASSESSMENT OF,
COMPETENCY-BASED CURRICULUM IN
DISCIPLINES OUTSIDE OF PHARMACY

For many years educators and the general public have been dissatisfied with education and have discussed competency statements and objectives as a remedy. Presumably competency or performance based education as an alternative approach to curriculum development had its origin in this dissatisfaction with pre-school, elementary, secondary, vocational, and higher education. It may have been fired by the growing concern for protection of the public welfare in areas where a person's training presumably qualifies him for a unique task such as with pharmacists, dentists, doctors or lawyers. We as consumers have come to expect a progressively higher degree of competence from our professionals. In some cases this expectation has not been fulfilled and hence we have become dissatisfied.

Another explanation of the dissatisfaction might be our increasing concern for equal employment opportunity and affirmative action. Competencies are not only a way to control and maintain the quality of those practicing a skill but also a method of insuring entrance into a job and possibly a profession for all qualified candidates irregardless of formal training, race, political or religious beliefs. The idea here is that those who demonstrate prerequisite competencies are admitted while those who do not are excluded regardless of training and/or experience. We have a long way to go to meet that goal.

Notwithstanding the apparent groundswell in favor of competency-based curriculum most of us in education have been inordinately successful in avoiding competency-based curriculum. James Popham reported ten identifiable reasons which educators employ to escape the appropriate use of competencies. I will

examine each here and attempt to refute the objection contained in or implied by that reason.

Reason one: Trivial competencies are the easiest to operationalize, hence the really important outcomes of education will be underemphasized.

The very fact that we can make these competencies explicit permits the educator and colleagues to scrutinize them carefully and thus eliminate any not supportable as worthy outcomes.

Reason two: Prespecification of explicit competencies prevents the educator from taking advantage of instructional opportunities unexpectedly occurring in the learning environment.

Specification of explicit ends for instruction does not necessarily specify the means to achieve those ends. Serendipity in the classroom is always welcome, but, and here is the important point, it should always be justified in terms of its contributions to the learner's attainment of worthwhile objectives. Too often instructors believe they are capitalizing on unexpected instructional opportunities in the classroom, whereas measurement of pupil growth toward any defensible criterion would demonstrate that the results were merely entertainment for the pupils, temporary diversion, or some other irrelevant classroom event.

Reason three: Besides student behavior changes, there are other types of educational outcomes which are important, such as changes in parental attitudes, the professional staff, community values, etc.

Certainly, we would like to bring about desirable modifications in such realms, but as a number of educational philosophers have reminded us, education cannot be all things to all people. All modifications of attitudes of professional staff, etc., should be weighed in terms of a later measurable impact on the learner himself. Hence, all modifications in personnel or external agencies

should be justified in terms of their contribution toward the promotion of desired pupil behavior changes.

Reason four: Measurability implies behavior which can be objectively, mechanistically measured, hence there must be something dehumanizing about the approach.

Resistance probably is most strong regarding earlier forms of measurement which were almost exclusively examination based, and were frequently multiple choice test measures at that. A broadened conception of evaluation suggests that there are diverse and extremely sophisticated ways of securing qualitative as well as quantitative indices of learner performance such as unobtrusive measures.

Reason five: It is somehow undemocratic to plan in advance precisely how the learner should behave after instruction.

Instruction by its very nature is undemocratic and to impley a freewheeling democracy is always present in the classroom would be untruthful. Instructors generally have an idea of how they wish learners to behave, and they promote these goals with more or less efficiency. Society knows what it wants its group to become, perhaps not with the precision we would desire, but certainly in general.

Reason six: That isn't really the way teaching is; teachers rarely specify their goals in terms of measurable learner behavior; so let's set realistic expectations of faculty.

I readily concede that few faculty specify their instructional aims in terms of measurable learner behavior; <u>but they should</u>. The way teaching really is at the moment just isn't good enough.

Reason seven: In certain subject areas, e.g., fine arts and the humanities, it is more difficult to identify measurable pupil behaviors.

Instructors in the field of art and music often claim that it is next to impossible to identify acceptable works of art in precise terms, but they judge works all the time. Any English teacher will tell you how difficult it is to make a valid judgment regarding a pupil's essay. Instructors have a set of criteria. They must have to make judgments which they do all the time. But they are loath to describe them in terms anyone can see.

Reason eight: While loose general statements of objectives may appear worthwhile to an outsider, if most educational goals were stated precisely, they would be revealed as generally innocuous.

If what we are doing is trivial we should know it. Those who support educational institutions should know it. We must abandon the ploy of confusion and make clear what we are doing.

Reason nine: Measurability implies accountability; faculty members might be judged on their ability to produce results in learners rather than on the many bases now used as indices of competence. Faculty might be judged on their ability to bring about desirable changes in learners.

They should be. A teacher should not be judged on the particular instructional means used to bring about desirable ends.

Reason ten: It is far more difficult to generate precise competency statements than to talk about them in our customary vague terms.

Here is the significant objection. Faculty members are far too busy to spend the necessary hours stating competencies and objectives in precise measurable form. They do not have the time to develop the accompanying measurement procedures with the necessary precision. Now is the time to provide adequate and appropriate help for accomplishment of those ends.

Now you know how I intend to respond to any questions. Hopefully this will provide us with a spirited discussion session following the presentation or for

that matter anytime you desire we can discuss Competency Based Curriculum.

On with the show or in this case the presentation. It is important that we all have a clear understanding of the definition of Competency Based Education I am using. Others may have differing views on a definition and as a result may present the components with more or less vigor depending upon their outlook. I will take the hard line.

A definition for Competency Based Curriculum has three parts--competency identification, criteria level, and assessment. Please note that I feel you are not forced to use a specific instructional strategy just because you have a Competency Based Curriculum. Contrary to what some appear to say, modules are not an integral part of a Competency Based Curriculum.

Part one of the definition indicates competencies are to be derived from specified roles, stated in measurable terms, and validated or evaluated with reference to performance of the specified role. Competencies derived in such a manner should be made public prior to holding persons accountable for their performance or achievement.

With the competencies derived in this manner one must establish appropriate criteria levels. The criteria level is the performance necessary for certification of an individual as having attained a specified competency. Derivation of each competency criteria level should be based upon the specified competency, related to the potential of future performance, and explicit with reference to the role in which competency is expected. The criteria level should be as objective as measurement techniques permit.

After the criteria level is specified for each competency an assessment strategy should be derived from the competency statement. It should utilize performance as the source for decision making and be objective. It is important to realize that competency based curriculums do not rule out assessment

strategies but the competencies indicate which assessment procedures offer the best test of performance. Lastly assessment procedures need to be objective if they are to be fair.

Using this as a definition of Competency Based Curriculum I propose five steps for a competency based program development model. These are traditional procedures but nonetheless important. These steps are:

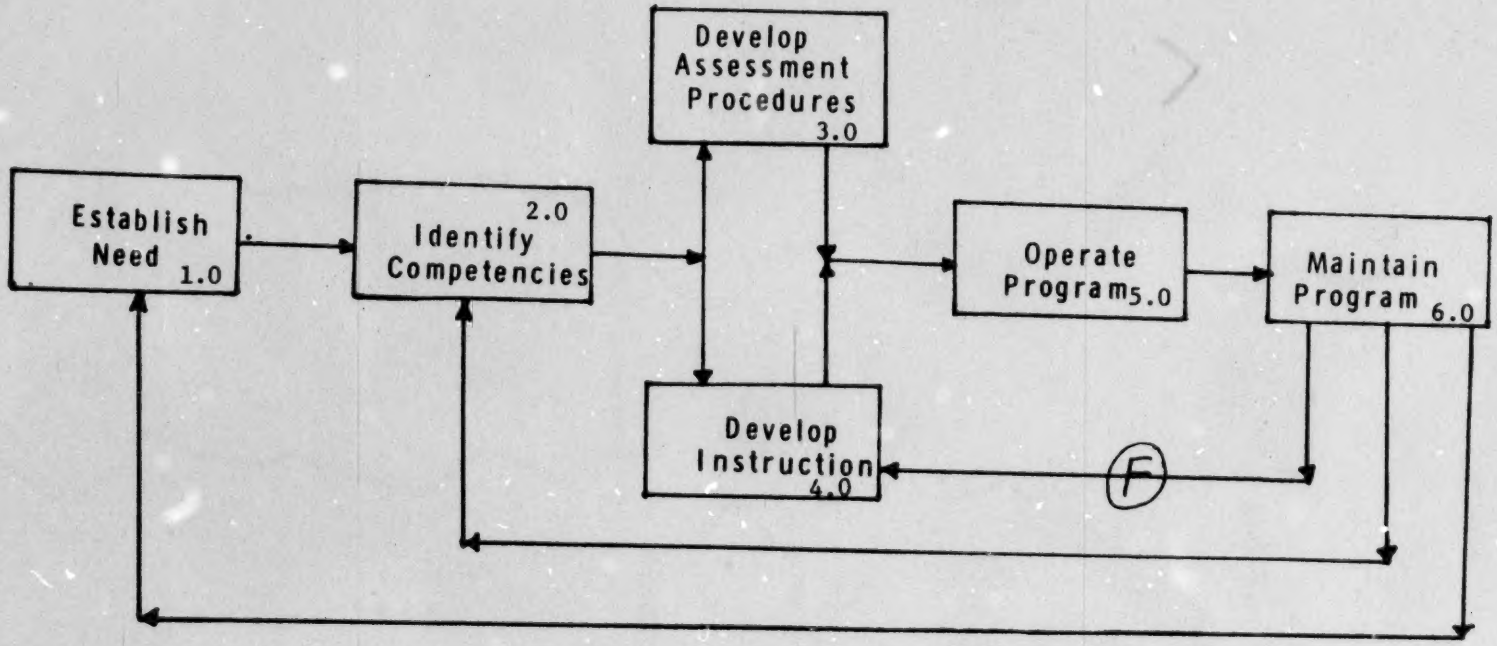
1. assess the need for such a program, specify the role or performance to which it will be directed and probable characteristics of the program;
2. determine the competencies necessary for competent performance;
3. prepare assessment procedures for the competencies;
4. develop instruction and instructional assessment intended to teach the competencies and measure performance of instruction; and
5. maintain the program through reassessment of competencies, criteria level, instruction, assessment procedures and need for its existance.

The last step--program maintenance--is most frequently omitted. It is a critical component if contemporary curriculum at minimum student and faculty cost is desired.

Such a model presented in Logos modeling language at the first level of detail might look like Figure 1. Need is established (1.0), competencies are identified (2.0), then competency assessment procedures (3.0) and instruction (4.0) are developed based upon the competency statement. Next the competency based curriculum is put into operation (5.0) and student performance on instruction and the competencies among other factors constitute, feedback which provides direction for instructional development and possibly improved assessment procedures--it does not change our specified competencies (6.0→4.0). Lastly the curriculum is maintained (6.0) by providing information on achievement of the broad goal--preparation of competent (<u>you fill in the blank</u>). This general model needs to be at the third or fourth level of detail in order to provide mileposts for curriculum development. What I presented was the general overview of such a model.

Figure 1

CB CURRICULUM DEVELOPMENT MODEL



CB Curriculum Development Model: General Level	
Drawn by: Jean Lunde	Designed by: Daniel J. Dobbert University of Minnesota
June 24, 1975	Second Revision June 19, 1975

Everyone involved in the competency based movement, as some call it, has his/her own ideas of what constitutes an ideal Competency Based Curriculum. So as not to keep anything from you, here are mine.

A desirable competency based curriculum, in my opinion, would have these characteristics:

1. the rate of progress for students would be determined by demonstrated competency, not time or course completion;
2. instructional activities would facilitate performance without unnecessary or redundant exercises and experiences;
3. students would be held accountable for active participation in the curriculum and faculty are held accountable for providing experiences with the greatest potential for achieving the competencies;
4. the curriculum should be individualized and personalized to student needs;
5. emphasis would be placed on exit rather than entrance requirements;
6. the design of instruction would be guided by performance of students with the curriculum;
7. there is a constant revalidation, review, and updating of the competencies and content; and lastly
8. a program of continuing education accompanies the initial preparation.

Keeping those characteristics in mind let's compare an ideal competency based curriculum with what, for lack of a better term, will be called the common program. A CBE program would use the students performance as the achievement indicator, time determiner and criterion. The common program would use subject matter and ability to explain the job as the achievement indicator. It would use uniform time blocks, subject matter and letter grades for advancement. There would be little concern for entrance requirements in a CBE curriculum. Licensure requirements would be the competencies. There would be no fixed rules as to when, where or how learning is to be accomplished and there would be opportunities for practical experience in the field in which a student is being

trained. Students in a common program, on the other hand, would have to attain normative entrance standards, they would have to meet certification requirements derived from the instructional programs and the judgment of practicing professionals. The program would normally be on a campus and limited field experience would typically come late in the student's educational program. The change to CB curriculum could, in my opinion, bring about worthwhile and long discussed changes.

A move to Competency Based Curriculum necessitates (1) competency identification, (2) validation or evaluation of competencies, (3) establishment of competency criteria level, (4) development of assessment for individuals to determine the presense or lack of a specified competency, (5) appropriate instructional design, and (6) a maintenance program for the total Competency Based Curriculum. I will examine the first four parts in some detail.

Competency identification is either an analysis or synthesis procedure depending upon our goal. Identifying currently needed competencies can best be done through analysis while creation of the "should have" variety of competency is a job for synthesis. Simply stated, analysis is the separation of the functioning of a competent practitioner into the component parts while synthesis is combination of components to creat a new type of competent practitioner. In analysis we want to create more practitioners like those which exist and in synthesis we want to create something new that will fulfill previously unmet needs.

There are many ways to identify competencies. The way you select to identify competencies will determine what statements can be made about the resultant competencies.

Writing competencies from the present curriculum limits one to maintaining the present program. This may be very adequate depending upon the relationship of the present program to the job students will subsequently be expected to

perform.

Task analysis is the broad name for three procedures--job, skill and topic analysis. Job analysis is the description of the physical and psychomotor skills necessary to accomplish a job. Skills analysis is how the job is accomplished and topic analysis is the description of an intellectual task such as solving simultaneous equations. Needless to say identification of competencies through task analysis would require use of methodology from all three procedures.

Content analysis aims at the objective quantification of content classified using a system of categories and explicitly formulated rules. It gives guidance as to objectives contained in content. It's a fancy way of obtaining objectives from the present program.

Logical analysis is the examination of the rationale behind each objective and competency. If the rationale supporting an objective or competency logically leads to accomplishment of the goal then that objective or competency should be retained. If there is not such support then the objective or competency should not be kept.

Surveys are a technique for identifying competencies through population or group opinion. Some major strategies under the survey heading are: scaling, question completion, semantic differential, Q-Sort, and Delphi technique. This is not an inclusive listing. Scaling is a technique where the competencies are rated for value on a scale, usually a numeric one. Question completion involves using answers to a questionnaire to support or not support competencies. The semantic differential survey uses words (usually five or seven) to describe something on a bipolar scale and the respondents indicate where their response best fits. A Q-Sort requests the members of a sample to rank or order competencies, etc. using some value system, usually highest to lowest importance. Lastly, the delphi technique which obtains the lowest common denominator consensus of a population or group.

Observation and Expert Opinion is the methadological category under which I have placed several strategies: unobtrusive measures, accreditation procedures, category systems, rating systems, and goal analysis. Unobtrusive measures use an indirect measure to determine something. For example one can use the wear and tear on tile flooring to determine the amount of business a store has. One can determine the orignal thickness of the flooring, the amount of wear caused by "every-so-many" people" walking on it. Subtract the present from original thickness to determine wear, divide by the wear caused by "every-so-many people"; and multiply that result by the number included in "every-so-many people" to determine the estimated number of potential customers. Accreditation procedures use expert professional opinion and membership judgment to establish standards. Category systems are methods where behaviors are placed in groups using some criteria. A job analysis following some methodologies is an example. With rating systems, professionals are asked to rate performance and the results are used to derive competencies. Lastly, goal analysis uses a group consensus or a modified delphi procedure to establish competencies on a face to face level. In other words, responses are verbal, not written.

Analysis of documents grouping has three components: survey of literature, unobtrusive measures, and content analysis. We all know that survey of literature is a review and determination of what authorities have said. Unobtrusive measures as used here is a technique for collecting frequency of mention for various behaviors and then refining them into competency statements. Content analysis is where content of instruction is examined to determine underlying competencies taught or necessary.

A rarely if ever used methodology is the anthropological study. This

procedure permits the researcher to look at the person, relationships, and influences in decision making. The core as well as some "should have" competencies can be derived from the resulting ethnography. Utilization of this approach results in a very complete study of a job, role or activity.

All these techniques rely upon selection of a sample from a population. Only rarely are our sample and population the same. Therefore, it is important to note the technique used in selecting a sample. Here are five sampling procedures, there are others:

1. Haphazard - sample based upon accessibility with no concern for representativeness;

2. Judgment - sample based upon best guesses or expert choice on what represents a population;

3. Quota - units are drawn to represent population by filling a specified quota, but as in judgment sampling, there is no guarantee that this is the case;

4. Probability - every member of the population is assigned a non-zero probability of selection; the probabilities need not be equal though they often are to increase certainty of drawing a representative sample;

5. Lastly, is the random sample which we are all familiar with.

The methodology used in identifying a competency limits or qualifies what statements can be made concerning it. Ideally the competency should be referenced to and derived from the group for which it was developed. A partial exception to this is in the case of synthesized or "should have" competencies. They should be referenced to one group but they may be generated by another population. Consumers or other health care delivery personnel could generate competencies they desire of the pharmacist.

How does one know when they have properly stated a competency? The answer to that question, though apparently easy, is complex. It is essential that one can identify a good competency statement when they see one. Here are some guidelines (see Table 1) for that purpose.

One should examine three areas when looking at a competency - interrelationships among competencies, extrinsic evaluation, and intrinsic evaluation of individual competencies. Examination of interrelationships among competencies covers four points. First, are there a significant content and number of competencies to determine that the goal has been accomplished. Second, is each competency necessary for achievement of the goal. Third, is a competency the same as another but wrapped up in different words. Fourth, is the competency too fine or included in other competencies. Extrinsic evaluation also has four points. First, is level of performance as conceptual as possible. Second, does the competency statement provide an appropriate amount of detail. Third, is the language clear. Last, is the statement of competency as brief as possible. Unnecessary verbage is not necessary. Finally is intrinsic evaluation which has five components. First is the competency stated in measurable behavioral terms. Second, is the situation of performance stated. Third, does the competency statement indicate tools used or not used in performance. Fourth, is the criteria for acceptable performance stated. Last, does the objective avoid specifying a learning process unless it is critical to the competency. Positive answers to these questions should lead to the identification of a properly stated and measurable competency.

Derivation of a competency is not the end. Our next step should be to validate or evaluate that competency. The purpose of validation and evaluation is fourfold. First is to determine the value of a competency for a person in their subsequent performance. Second is to insure that we identified an inclusive set of competencies. Third are the competencies performed by practitioners or should they be. Lastly is to verify that the competency identification reference group was in fact, the people for whom the competencies are intended. The specific purpose must be phrased with reference to the type of competency

Table 1

CHECKLIST FOR COMPETENCIES

A. Interrelationships Among Competencies

1. Sufficiency
2. Necessity
3. Lack of Redundancy
4. Lack of Triviality

B. Extrinsic Evaluation

1. Level of Performance
2. Level of Specificity
3. Language
4. Brevity

C. Intrinsic Evaluation of Individual Competencies

1. Behaviorality
2. Range
3. Aids
4. Standards
5. Process Independence

identified ("should have" synthesis or "essential" analysis).

You realize measurement, evaluation, and validation procedures are not as tight individually as one might desire. Therefore, I recommend that the multiple data point method, a method consisting of multiple strategies for collecting data be used to examine a question. If two or three procedures support a postion then that statement may be better than if one or more did. Naturally, there are many pitfalls here and a major one is that the procedures may not be appropriate or sensitive for the variable to be measured. Therefore, non-support does not allow one to say the competency examined is not a valuable competency, only that the procedure used did not offer support for it.

The strategies used for validation and evaluation could be the same as those used for identification. Both procedures could be done, in part, concurrently and usually are done this way for economy. The example provided in Firgure 2 includes a task analysis for reliability and validity, and a survey for better reliability, and an intensive case study for improved validity.

If our competency is in the "should have" category our choice for evaluation and validation would be logic based. This procedure consists of providing a logical argument to support the competency. Acceptance should be based on the competency permitting a performance which is desired. Who decides what is desired is important and he or she or they should be referenced in the support argument for such a competency. On the other hand essential competencies can be supported by current practice.

To clarify, multiple data point method can be used for the should have and necessary competencies. One could ask the same question of many members of the population. Several types of data could be collected for one unit of the population. Lastly, several data types could be collected from several members of the population. The key is repeated measure and sample selection (Figure 3).

Figure 2

MULTIPLE DATA POINT METHOD FOR COMPETENCY
Evaluation and Validation

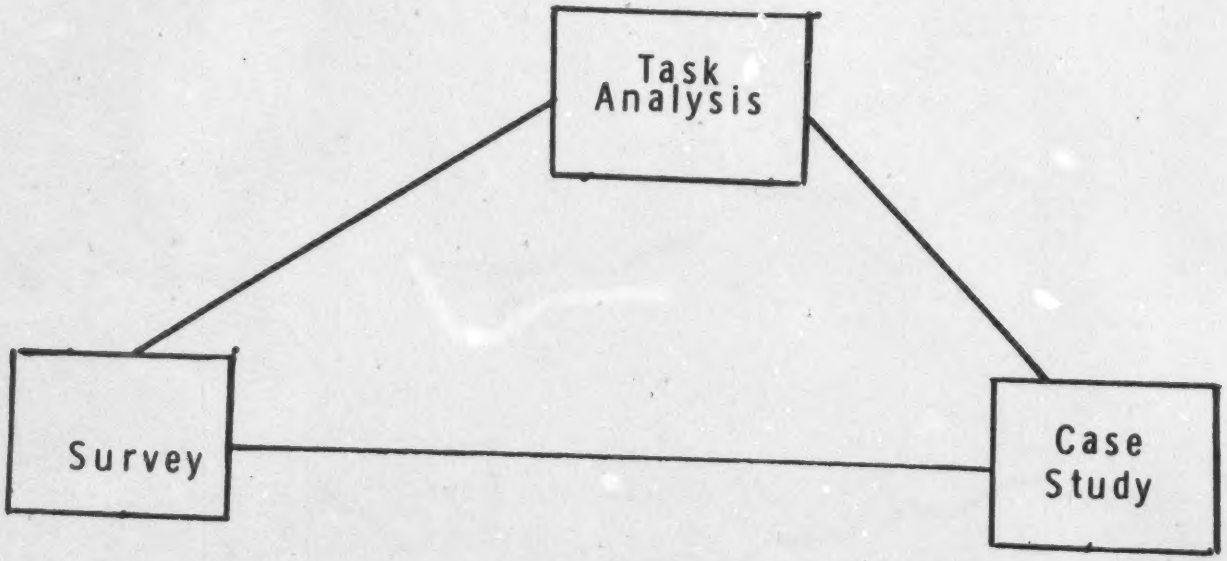
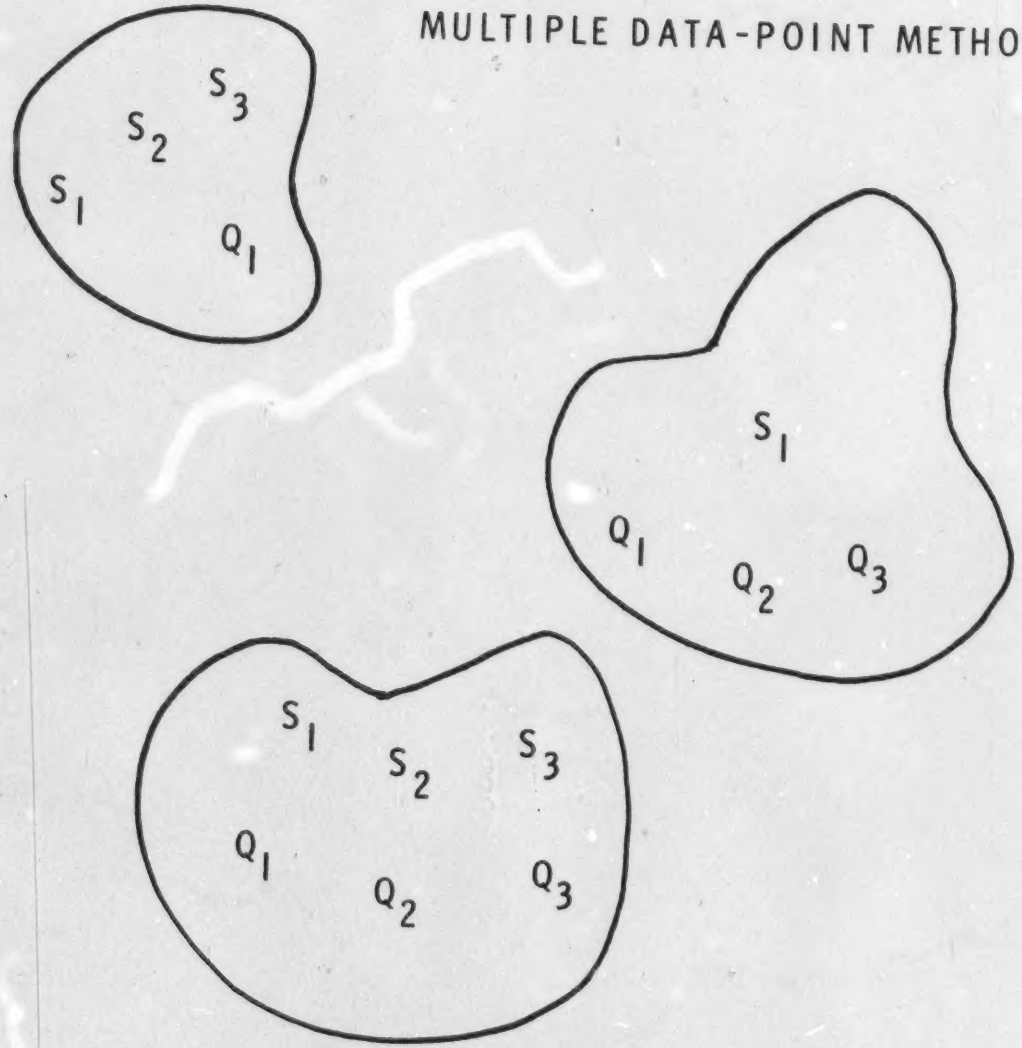


Figure 3

MULTIPLE DATA-POINT METHOD



The greater the number of respondents the better the reliability. Validity has a better chance as amount of data collected on an individual increases.

Now, we are ready to begin the establishment of criteria level of competencies accepted. Again, we must decide whether the criteria level should be referenced to individual or group judgment and to the actual performance or a judgment of proper performance. My recommendation is to use actual performance criteria referenced to a generalized job for the "necessary" competencies. For the "should have" competencies your only option is referencing to opinion. The referant group should be identified.

Several methods of establishing the criteria are presented here. First is the individual logical analysis or consensus appraoch. We are all familiar with establishment of creiteria by judgment or decree. I will not discuss it other than to mention that it's the quickest and most satisfying method. It is also, according to some, the least empirical, data based, or defensible. The second method is expectancy tables. This method consists of developing a contingency-type table to indicate the percentage of those who pass one measure and achieve a certain performance level on another measure. This is a type of correlation. A task analysis with care taken to precisely measure performance standards is a third method. Fourth is the anthropological study in which one collects performance standards as part of the methodology. Last and most volital is to separate practitioners into two categories - competent and non-competent. Then measure each group's performance level on the competencies being examined. For any methodology used, determine the ideal and realistic level. Then as long as the people fall within the ideal to realistic range they may be said to have attained the criteria for competency.

Competency assessment procedures are intended to identify those people who do or do not have competencies necessary for adequate professional perfor-

mance. The decision here is whether assessment is based on the performance after training or the educational content itself. Because I have put instructional assessment under instruction and I am more concerned about performance of the competency than course performance, I opt for the objective or competency assessment approach. The key here is that the assessment must have content validity with reference to the ultimate performance expected.

Several tests are possible. Teacher-made tests lend themselves best to content assessment though they usually lack data or reliability or validity. Standardized tests rank people with reference to others. Content tests are directly derived from content; as long as content and competency are equivalent we have a measurable procedure. Criterion tests are even a little better as passing or failing is based upon criteria level. Domain referenced instruments assess one's ability to some amount of the content task domain. Simulation in paper and pencil format allows one to actively perform and report his/her actions. This is still one step away from performance. Lastly, is the assessment center for role playing, simulation and gaming with live interaction. It probably provides the closest assessment of performance in the real work world.

The key in competency assessment procedures is to recreate the real life situation as closely as possible. It is also good to utilize more than one reference before making a decision on competency. Decisions based on several types of evidence are stronger than those that rest on one only. The multiple data point method might be applied here (See Figure 3).

Another important point to remember is that success in instruction may not mean success with the competency. Passing one competency may not mean passing another. For that reason it is important to assess a participant with reference to every competency.

Once our competencies have been established we are ready to begin <u>educa-</u>

tional program development. This has two parts - instruction and instructional assessment which flow from the competency statement.

This presentation is not to cover instructional development so I will only skim over the highlights as they relate to Competency Based Curriculum.

There are major factors affecting the choice of CB Curriculum instructional approaches. First is the need to motivate the learner. The experiences must be rewarding if students are to learn. Second is the ability of the students to perform the competency prior to instruction and the prerequisite skills each student possesses. Last and most important is the nature of the competency to be realized.

Figure 4 gives you an idea of which strategies might be most appropriate for various classes of learning objectives. Remember, this is greatly simplified in terms of the number of variables affecting a decision concerning strategy.

When making a decision concerning strategy keep in mind that the procedure, content and strategy of instruction are derived from the competency, not set by it. Modules and competency based education are not tied one to another. Modules are an option. In addition, remember that competencies can be obtained using almost any strategy but some will be more efficient than others.

Figure 5 shows how I position various methodologies in competency based curriculum development along a scale for each of six factors. Others would disagree with me but this is my present feeling on the issue.

Now, look back at the general model for competency based curriculum development (Figure 1). We have quickly covered the first four elements of the model. The fourth instructional development was skimmed very lightly. The fifth and sixth elements, Program Operation and Maintenance, were not covered. They are very important if one is concerned about the accomplishment of the

Figure 4

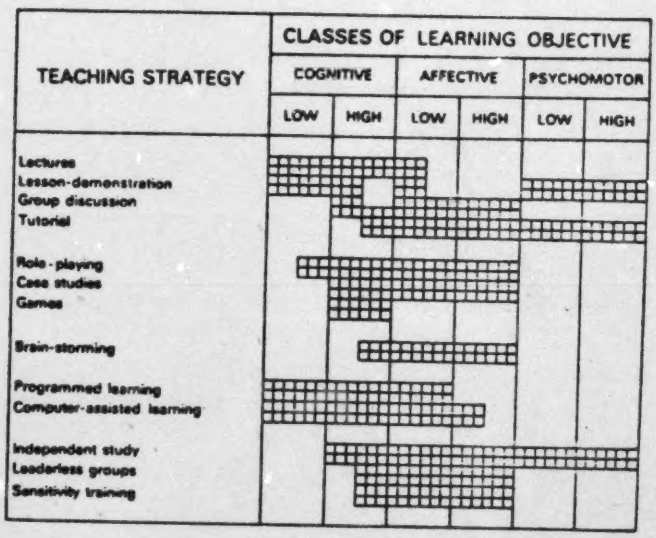
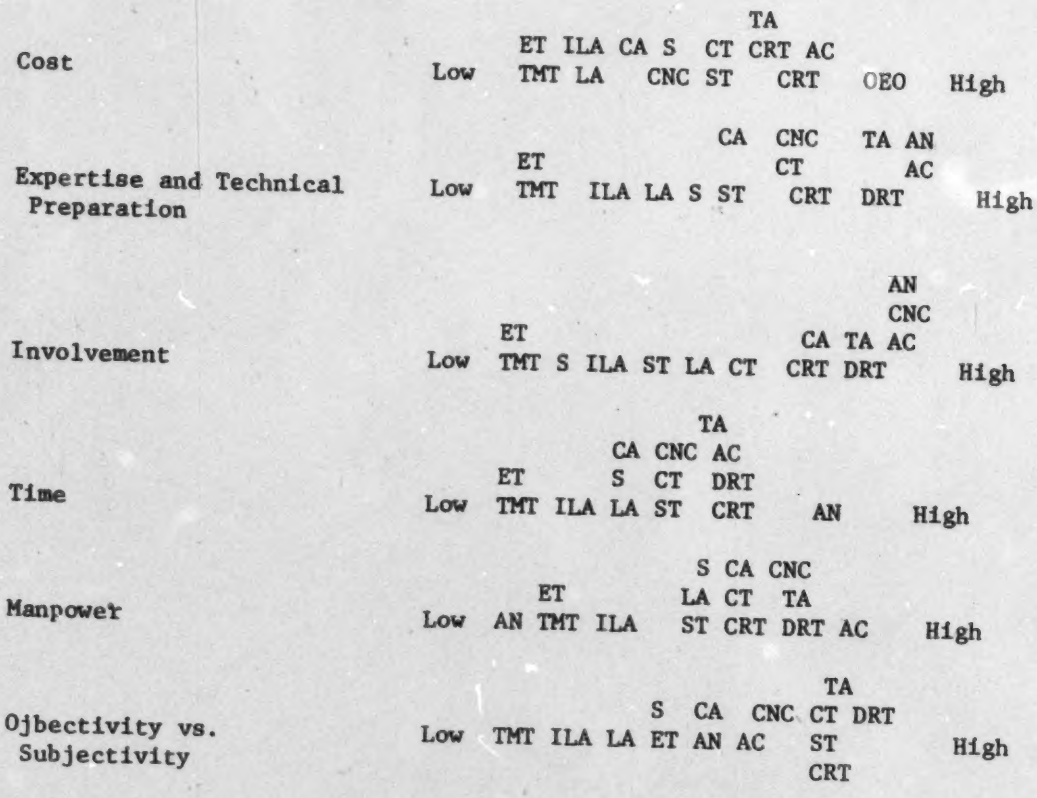

TEACHING STRATEGY
CLASSES OF LEARNING OBJECTIVE
COGNITIVE
AFFECTIVE
PSYCHOMOTOR
LOW
HIGH
LOW
HIGH
LOW
HIGH
Lectures
Lesson-demonstration
Group discussion
Tutorial
Role-playing
Case studies
Games
Brain-storming
Programmed learning
Computer-assisted learning
Independent study
Leaderless groups
Sensitivity training

Figure 5

FACTORS AFFECTING CHOICE AND ASSESSMENT
OF COMPETENCY APPROACHES



ABBREVIATIONS

TMT--TEACHER-MADE TESTS
ST--STANDARDIZED TESTS
CT--CONTENT TESTS
CRT--CRITERION TESTS
DRT--DOMAIN REFERENCED TESTS
AC--ASSESSMENT CENTERS
AN--ANTHROPOLOGIAL STUDY
LA--LOGICAL ANALYSIS
ILA--INDIVIDUAL LOGICAL ANALYSIS
ET--EXPECTANCY TABLES
TA--TASK ANALYSIS
CNC-COMPETENT VS. NON-COMPETENT
CA--CONTENT ANALYSIS
S--SURVEYS
OEO--OBSERVATION AND EXPERT OPINION
AD--ANALYSIS OF DOCUMENTS

program goals and the value of the program. It is important to keep competencies, assessment, and instruction contemporary and insure accomplishment of their specified goals. Operating a program in a manner which permits and encourages maintaining its quality is important if the program is to be of contemporary value.

Are there any questions?

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